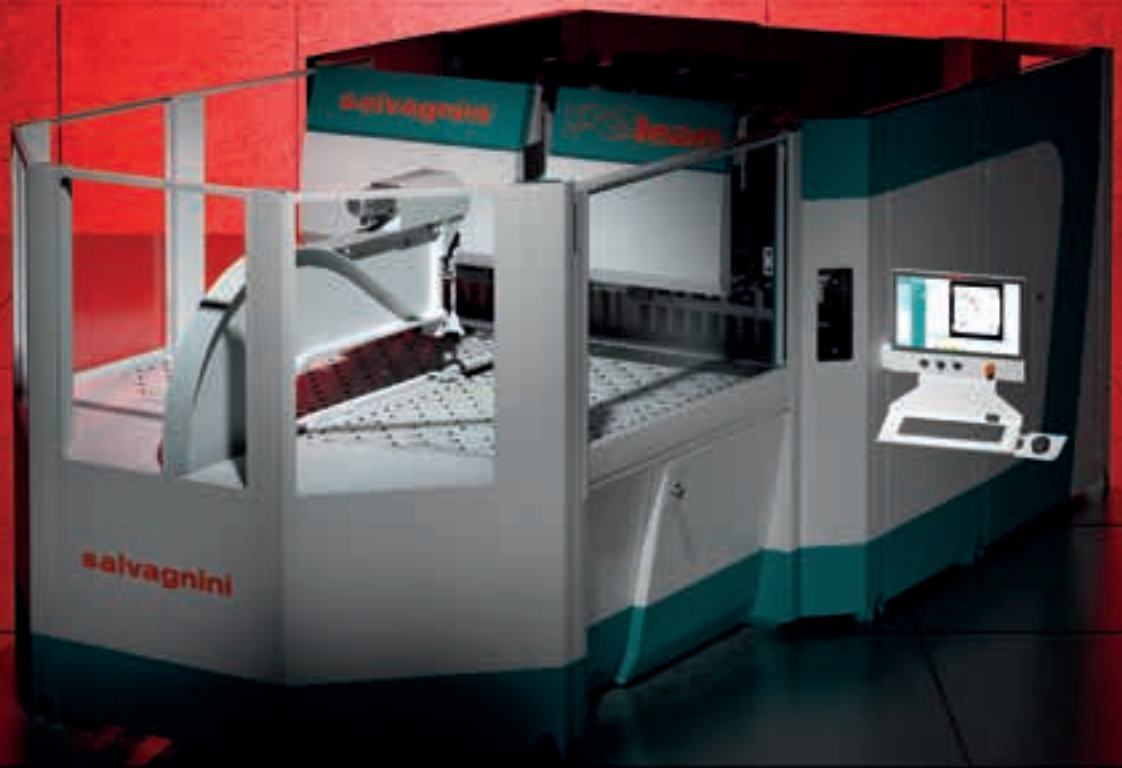
P2lean



The flexible bending solution

salvagnini

Flexible bending solution.

PRODUCTIVITY

How to combine productivity and flexibility?

Conventional bending is characterized by an average OEE of 30%, and flexibility depends on the tool change system, which is often costly and time-consuming, with lower dynamics compared to panel benders, or on the installation of more than one press brake. The P2lean, on the other hand, natively combines productivity, with its automatic bending and handling cycles, and flexibility, with its universal bending tools.

How long does re-tooling take?

The P2lean doesn’t require re-tooling: the upper and lower blades, the counterblade and the blankholder are universal tools that are able to process the whole range of thicknesses and machinable materials. And with its advanced cycles, the P2lean completes an average of 17 bends per minute.

Do manual loading and unloading affect the total cycle time?

Loading and unloading are performed by the operator, who positions the sheet metal on the worktable and collects the product after bending. The P2lean's cycle minimizes the impact of these activities on total cycle time, as it allows the product to be unloaded after positioning the sheet on the worktable, thus combining two operations in a single action.

Does the P2lean‘s set-up affect productivity?

The set-up has minimal impact on the panel bender's productivity: when the program is loaded, the blankholder automatically adapts in masked time, and the manipulator gets into position for gripping and handling the sheet.

How to produce in kits or batch-one?

The P2lean is equipped with an automatic ABA blankholder, which adapts the length of the tool according to the size of the part to be produced, in-cycle, without machine down times or manual re-tooling: the ideal solution for batch-one and kit production.

The **P2lean** natively combines **productivity**, with its automatic bending and handling cycles, and **flexibility**, with its universal bending tools.

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Intelligent system, constant quality.

PRECISION

How to achieve maximum precision?

The sheet metal is centered, just once at the start of the process, against controlled reference stops: this minimizes the cycle time as well as any precision errors, which are all absorbed by the first bend. The bending formula automatically optimizes the bending parameters to reduce waste, while MAC2.0 detects and automatically compensates any variability in the material to guarantee precise, high-quality bends, reducing set-up times.

ADAPTIVITY

How to make production independent of changes in material?

MAC2.0 is the set of integrated technologies – sensors, formulas and algorithms – that make the panel bender intelligent: it eliminates waste and reduces corrections, measuring in-cycle and automatically compensating any variability in the material being machined.

How to make production independent of external variations?

The P2lean integrates advanced sensors that measure the actual thickness and effective size of the part to be machined, and detects any deformations caused by variations in temperature. The data are fed in real time into the bending formula, which defines the correct force to apply to the sheet metal, guaranteeing the precision, repeatability and quality of the finished product.

How to adapt the panel bender to different production needs?

In addition to the automatic ABA blankholder, the P2lean offers a range of options to guarantee maximum versatility and adaptability, to suit any production strategy or mix.

How to make the process reactive to changes in the production lists?

The P2lean can be equipped with proprietary OPS software, which ensures communication between the panel bender and the factory ERP: depending on needs, OPS manages the production of sequences of different parts. Universal bending tools, automatic in-cycle set-up and automatic handling allow the system to respond to any requests immediately.

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The compact panel bender for lean, flexible production.

Adaptive system
The integrated adaptive technologies (advanced sensors, bending formula, MAC2.0) make the system intelligent and able to **automatically adapt** to changes in the material and the external environment, **eliminating waste and corrections,** and extending the range of products that can be made.

Flexible automation
It uses **universal bending tools** which automatically adapt in-cycle to the panel geometry, without machine down times or manual re-tooling, allowing **batch-one or kit productions.**

Connectivity 4.0
The proprietary **LINKS**, **STREAM** and **OPS** software establish communication between the system and the departments involved in the production flow.

Production versatility
It offers **customized solutions**, including **auxiliary tools** and **additional devices** for special geometries or **different loading/unloading solutions** with additional door (PIN2) or robot (PIN3).

Sustainable technology
The technical solutions adopted (Direct Drive and pneumatic and electric drives) allow it to **respect both people and the environment** without reducing its productivity. It runs with just 22 l of long-life oil, inside a fully sealed circuit.

Salvagnini is panel bending, panel bending is Salvagnini.

Over **3,600 installations in 76 countries, the world's largest panel bender manufacturing plant and over 40 years of experience** and competence speak for themselves: Salvagnini is an authority on "panel bending 4.0", a flexible process the likes of which has never been seen before, whose application boundaries are extended to sectors and environments that have always been considered poorly suited to this technology. There are four P2lean models to choose from, for bends up to 98.43" in length and 8" in height.

Four P2lean models to choose from, for bends up to 98.43" in length and 8" in height.

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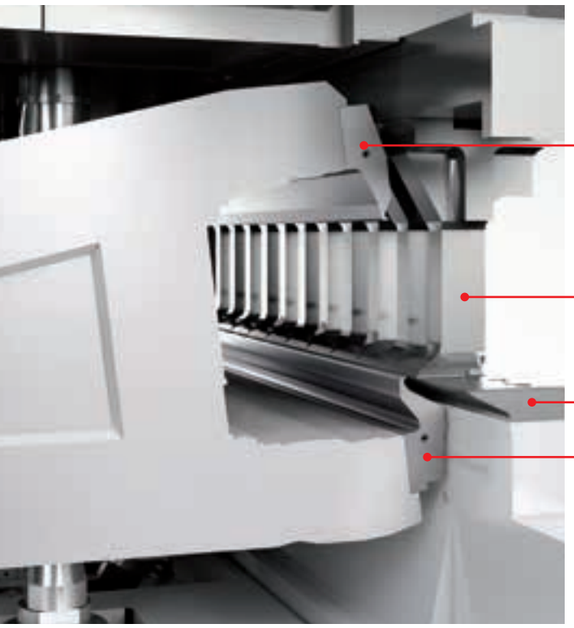
Flexible automation.

Upper and lower blade, counterblade and blankholder are the **four universal tools** used to process the whole range of thicknesses and machinable materials, from 27 to 11 gage, during the cycle and without machine down times or manual re-tooling.



The upper and lower blades (A, D) are the two tools featuring interpolated controlled movement and responsible for bending.

The automatic ABA blankholder (B) works simultaneously with the blades and counterblade to bend and clamp the sheet accurately and effectively. It adapts the tool length according to the size of the part being produced during the cycle, without machine down times or manual re-tooling. The tool profile allows inward bends up to 1.77”.

The counterblade (C) helps clamp the sheet during the cycle.

Automatic manipulator: fast and accurate.

Quickly and fully automatically, this moves, handles, grips and rotates the sheet metal throughout the whole machining cycle. It requires no manual interventions during the cycle. **The operator positions the sheet metal on the worktable** and collects the product after bending, performing only the loading and unloading operations.

Operating mode: simple, quick and lean.

Bending on each side of the sheet is achieved thanks to the **controlled interpolated** movements of the blades.

Down bend
NEGATIVE

Up bend
POSITIVE

Flattened bend
WITH BLADE

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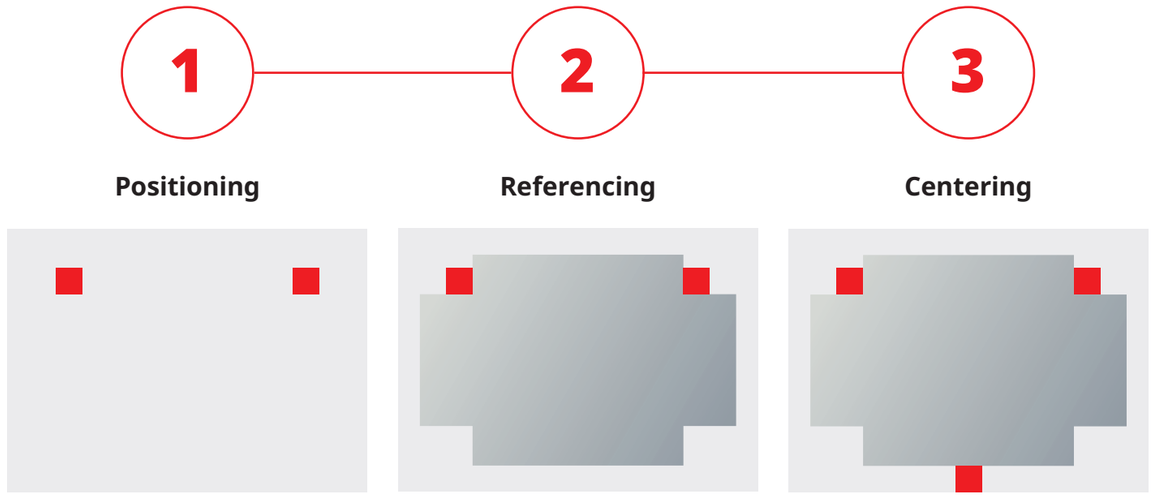
Adaptive system.

One single and controlled centering process.
The sheet metal is centered, just once at the start of the process, against controlled mechanical stops: the cycle time is minimized and any precision errors are all absorbed by the first bend.

The mechanical stops are a further guarantee of finished panels of the correct size, every time.



Proprietary bending formula.

Developed over the years, the bending formula defines the force and manages the movements of the universal tools, analyzing different parameters in real time, including deflections, temperature and thickness, guaranteeing the precision, repeatability and quality of the finished product.

MAC2.0

MAC2.0 is the set of technologies that measure all possible variations compared to the nominal value of the mechanical characteristics of the material, compensating where required and adapting the movements of the bending unit during the cycle.

This translates into constant part quality, whatever the variability of the material being machined, eliminating waste and optimizing production times to ensure full productivity. Moreover, by guaranteeing precise bends whatever the material, MAC2.0 helps to reduce the cost per part.

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Sustainable technology.

Direct drives.

The P2lean panel bender adopts only electric actuators, thus removing the hydraulics. Bending cylinders are driven by brushless motors, which has great advantages in terms of the reduced wear and deterioration of components that, unlike in other similar technologies, are no longer subjected to continuous extreme stress over and over on the same point. Average in-cycle consumption does not exceed 4 kW.

Intelligent energy use.

The masked-time cycles and drive wiring help to use all the absorbed energy in the best way, without returning it to the grid and without it being dissipated as heat.

Production versatility.

Custom solutions to widen versatility.

P tools: auxiliary tools that can be engaged and disengaged beneath the blankholder, rapidly and automatically, to handle narrow panels or make tubular, hidden or radius bends or bends with intrusive embossings.

CLA tools: auxiliary blades, modular in length, available in both positive and negative versions, for making upward or downward tabs. They engage and disengage between the sheet metal and the blades, quickly and automatically, to make bends that are shorter than the whole sheet length. Auxiliary blades can be set up manually or automatically, with the CLA/SIM option, which composes sequences of different lengths in masked time.

Advanced programming.

STREAM

STREAM is Salvagnini's answer to the modern industrial context, a programming suite that improves reactivity and reduces costs, operating errors and process inefficiencies.

Industry has changed: flexibility and efficiency are fundamental requirements for managing increasingly smaller batches or rapid part code turnover. STREAM is Salvagnini's answer to the modern industrial context, a programming suite that improves reactivity and reduces costs, operating errors and process inefficiencies. STREAM is the integrated environment for managing all activities in the office and on the factory floor, the only point of access for all technologies, from cutting to bending, meeting all planning, programming, production, management, control and optimization needs throughout the production process. Moreover STREAM can be used to calculate costs, including upstream and downstream processes where necessary.
It is structured on three levels: technical, productive and business.

STREAMBEND.EDIT

STREAMBEND.EDIT is the software for developing panel bending programs, including multiple parts:
- in automatic mode, it develops programs independently, starting from a 3D model;
- in interactive mode, it is used for generation/editing/completion operations.

It includes a simulator that can assess the results obtained on the machine.

PARTS

PARTS is the software used to manage the whole database of products and parts:
- it classifies the elements according to common or customized categories;
- it defines the production flows for each part to be machined;
- it generates the relative programs.

VALUES

VALUES is the software which provides an accurate estimation of production costs. It allows calculation not only on the basis of the individual technology, but also over the entire process, including upstream and downstream machining where necessary.

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Connectivity 4.0

The Salvagnini-patented LINKS and OPS software allows two-way online communication between machine, office and customer ERP.

Salvagnini's IoT solution, **increases the global efficiency** of the panel bender. LINKS allows real-time monitoring of the **machine's performance** and independent analysis.

LINKS

OPS

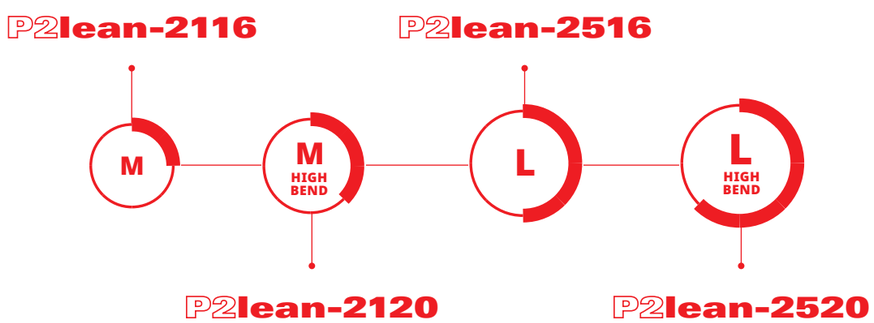
Is the modular software which optimizes the entire **production process** and which allows it to be controlled through interaction with the **ERP/MRP** inside and outside the factory.

Built around you.

Salvagnini offers four P2lean models to bend up to **98.43" in length and 8" in height**, to meet all production needs, and to maximize the use of the panel bender.

TECHNICAL SPECIFICATIONS	P2lean-2116	P2lean-2516	P2lean-2120	P2lean-2520
Maximum length of incoming sheet (in)	98.23	110.03	98.23	110.03
Maximum width of incoming sheet (in)	63	63	63	63
Maximum diagonal that can be rotated (in)	98.43	110.23	98.43	110.23
Maximum bending force (kN)	330	660	330	660
Maximum clamping force (kN)	530	1060	530	1060
Maximum bending length (in)	85.83	98.42	85.83	98.42
Maximum bending height (in)	165	165	203	203
Minimum thickness (gage)	6.50	6.50	8	8
Maximum thickness and bending angle steel, UTS 59500 psi (gage)	11 (±90°) 13 (±120°) 14 (±135°)	11 (±90°) 13 (±130°) 14 (±135°)	11 (±90°) 13 (±120°) 14 (±135°)	11 (±90°) 13 (±130°) 14 (±135°)
Maximum thickness and bending angle stainless steel, UTS 84200 psi (gage)	13 (±90°) 14 (±120°) 16 (±130°)	13 (±90°) 14 (±125°) 16 (±135°)	13 (±90°) 14 (±120°) 16 (±130°)	13 (±90°) 14 (±125°) 16 (±135°)
Maximum thickness and bending angle aluminium, UTS 38500 psi (gage)	7 (±120°) 8 (±130°)	7 (±120°) 8 (±130°) 9 (±135°)	7 (±120°) 8 (±130°)	7 (±120°) 8 (±130°) 9 (±135°)
Average consumption (kW)	4.0	9.0	4.0	9.0
Noise level (Machine Directive 2006/42/EC) (dB)	68	69	68	69

Values refer to a standard machine. Salvagnini reserves the right to modify this data without prior notice.



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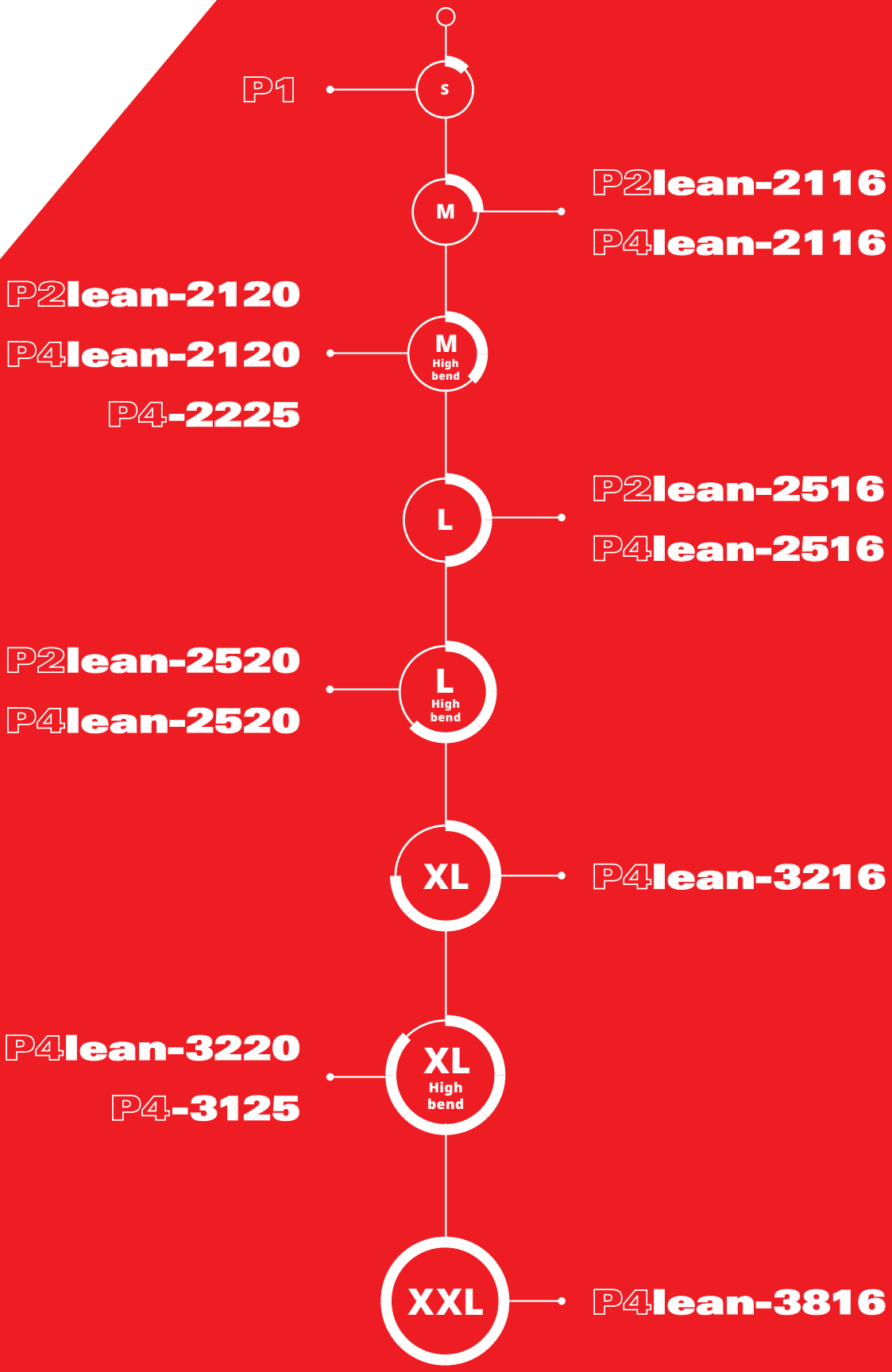
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